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The Driving School Leadership Forces: Attention to individuals and promoting renewal of schooling

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ABSTRACT: The exercise of leadership by school principals encompasses multiple roles including responsibility for the learning and educational outcomes within classrooms. However, leadership of the learning environment is related to and contingent upon other leadership functions. This dependency was investigated by structural equation modelling (SEM) of data from 389 teachers on their observations of their principals' behaviours. The instrument of data collection was a 50-item rating scale instrument constructed using Rasch modelling. The SEM results showed relations between 11 leadership variables and that variables concerning principal leadership of the school pedagogy were dependent on giving attention to individuals and promoting renewal of schooling.

Background

This article examines the Western Australian context in which the research described in the abstract was conducted, as well as previously constructed knowledge about school principal leadership, and the methodological issues considered in the research design. In the following sections, these matters are discussed leading to proposal of the theoretical framework for the empirical investigation.

Contextual and epistemological considerations

Until the mid-late 1980s, the traditional approach to leadership and its study in Western Australian schools centred upon teaching children and curriculum implementation. Schools were led by head-teachers. Head-teachers, usually male, were appointed to lead the school and the prime criteria for promotion were experience and teaching competence. At this time, the State education systems were led by a Director General who was a member of the State government public service and typically hailed from an educational background. The efficiency of the system was ensured by compliance with public service regulations and focused on evaluating the effectiveness of the system. This process was essentially internal and in comparison with more recent times, there was little press for major change or reform. Provided that schools functioned according to departmental regulations, the principal controlled the school. In such an environment, there was little need for research into school leadership or for principals to study educational leadership in a formal sense.

The formal study of educational leadership (as distinct from the leadership of industrial, business and public service organisations) commenced in America in the 1950s. An educational administration approach applying general theories of staff management and administrative functions was used to examine the leadership of schools. The application of administrative theory drew predominantly from studies of non-educational organisations. When applied to educational systems and schools the resulting theory was "**…**relatively new and distinctly American" (Knezevich, 1962, p. 4).

The grounding of educational leadership theory in theories of management, administration and the American 1950s context is significant for several reasons. First, school leadership was seen as an administrative process and was explained in terms of managing organisational behaviour. Second, schools were conceptualised as formal organisations and their operations were explained by organisational theory. Third, the training of school leaders became associated with the study of educational administration. Fourth, the social institution of education was scrutinised from business and managerial perspectives. As a consequence, the leadership of schools has become inextricably linked with management functions (Fullan, 2001), albeit some educational leadership theorists differentiate between management and leadership.

Notwithstanding this influence from organisational theory on understanding school leadership, the importance of the school instructional program, teacher instruction and student learning has re-emerged in the last two decades. This emphasis is often termed 'instructional leadership'. Gaffney (1989) viewed it as leadership behaviours. Instructional leaders devote more time to the coordination and control of the instructional program. They buffer the instructional core of the school and establish a supportive school climate; collaborate in evaluation and goal setting; maintain a balance between competing areas of influence; analyse decision-making processes and structure, and provide resources essential for student learning. They also recognise and analyse the values orientation of self and others and provide direction while recognising individuality. Scheerens and Bosker (1997, cited in Hill, 2002, p. 53) identified five dimensions of instructional leadership exercised by principals. These were time devoted to educational versus administrative tasks; the head teacher as a meta-controller of classroom processes; the head teacher as a quality controller of classroom teachers; the head teacher as a facilitator of work-oriented teams; and the head teacher as an initiator and facilitator of staff professionalisation. Although all these conceptions of instructional leadership have elements concerning instruction and leadership, these two elements are respectively supplemented by a variety of other elements. If a synthesis of all the elements were produced, the result would be complex and describe a range of leadership attributes not specifically related to student instruction or to schools. The point here is that while the notion of instructional leadership has utility in drawing attention to an aspect of school leadership that is different from the leadership of other organisations, the imprecision in defining the notion itself diminishes the utility of the concept.

In light of these historical influences, it may therefore appear difficult to produce an accurate, unique and encompassing description of school leadership. One way forward is to examine a framework of school leadership developed by Sergiovanni in 1984. He identified and defined multiple school leadership dimensions as 'leadership forces' (leader and follower behaviours). The *technical force* describes the management functions espoused by the proponents of 'classical' management theory - for example, planning, organising, staffing, directing, coordinating, reporting

and budgeting. The *human force* concerns supporting people, encouraging professional growth and building morale. This is similar to the management ideology of human relations. The human relations approach to management requires a 'participatory' or 'democratic' management style by managers who are skilled in working with people. Sergiovanni (1984, p. 6) described the *educational force* as "**…**expert knowledge about matters of education and schooling" and in so doing, highlighted the necessity for school leaders to possess and apply specialised knowledge about student instruction. The *symbolic force* focuses on the rituals and icons that symbolise what is valued within the school to provide a sense of direction. The final dimension, the *cultural force*, involves building a sense of community within the school so that staff are united and believe in the school as an essentially ideological system. The order of the five forces in this explication is significant. Sergiovanni (1984) considered that whilst some or all five forces are present in particular schools, 'excellence' in leadership will be evidenced by the presence of the latter two forces – the *symbolic* and *cultural* forces. From a perspective of leadership theory, the framework may be seen to acknowledge the management aspect of school leadership (technical and human forces), the instructional role of school leaders (educational force), and perhaps most significantly, provided a foundation for future theorising and research into ethical, moral and cultural leadership in schools (symbolic and cultural forces).

Notwithstanding Sergiovanni's (1984) recommendations, since the mid-1980s there has been strong press for educational and school reform - increased efficiency and effectiveness. The demand for improved efficiency in schools and systems has resulted in the application of business models of management and change based on the principles of corporate managerialism, sometimes termed *New Public Management* in Australia (Gronn, 2003). State Education Departments were made more accountable to government, schools and principals were held more accountable by the educational system, the Directors-General lost parts of their independence, and degrees of local community/parental involvement in school governance became mandated. The requirement to demonstrate effectiveness has subsequently led to increased emphasis on students attaining centrally prescribed educational outcomes and principals being held accountable for these outcomes. Ironically for principals, educational accountability increased concurrently with accountability for change of management and organisational practices. Balancing the administrative role with the curriculum/instructional role has therefore become a major challenge of the principalship. However, Murphy and Hallinger (1992) questioned the notion of balancing and considered that it was impossible for one person to give adequate attention to both roles. They viewed the capacity of principals to effect both pedagogic and organisational improvement as contingent on the individual principal's professional knowledge. That is, an understanding of teaching and learning, *and* of the theories and processes of educational change.

Locally, the formal accountability relationship between school principals and the Education District Director has required principals to substantiate the assertions made in the school's annual report. This entails providing convincing evidence of the outcomes of their leadership and information on the performance of the school. Consequently, the epistemological decisions that backgrounded this study were made in anticipation of how the resulting data might be used by schools and by the educational system – an ethical matter.

Methodological considerations

The complexity of theory about school leadership and the absence of a unified understanding of the role of school leaders, particularly principals, present a problem for empirical school leadership research. Also, the epistemological uncertainty in the field is further complicated by the diversity of methodological approaches applied and the subsequent difficulty in reconciling research findings. This matter is currently exacerbated by debate about the ongoing press for educational research in general to be scientific (Eisenhart & DeHaan, 2005; Howe, 2005). Another complication concerns the application of research findings and indeed the motives for conducting the research. That is, should the research intentions be about building new theory, confirming existing theory, informing practice, understanding current practice, stimulating change, improving schools, making schools more instructionally effective, informing practitioners, informing policy-makers and so on. One way to resolve this dilemma is to adopt a pluralist approach towards making sense of school leadership (Cavanagh & Reynolds, 2003). That is, to accept the presence of epistemological and methodological diversity on the understanding that no single theory or investigative paradigm is superior to others. Concomitantly, this requires recognising the inherent limitations in conducting empirical research including the adoption of particular theoretical orientations and methodologies. Also, the logical nexus between decisions about the research methodology and the epistemology should be maintained. In cognisance of these issues and the positivistic intentions of this research, the empirical investigation initially required specification of a theoretical framework of key concepts.

Theoretical framework

Development of the theoretical framework for this study commenced with consideration of the five *forces* within Sergiovanni's 1984 model and how this organisation of educational leadership functions might be reconfigured given the inherent contextual and temporal constraints of the study. First, the *technical* and *human forces* were combined into a generic management dimension. Second, and in contrast, the *educational force* was seen as leadership of the school pedagogy. Third, when Sergiovanni explained the *symbolic* and *cultural forces*, he used examples specific to the leadership of teachers. Significantly, parents, caregivers, students, and local community members were not seen as part of the school 'community' and as influences on the culture of the school. Also, his differentiation between symbolism and the development of a 'culture' may well be problematic because definitions of culture usually include rituals and icons as aspects of a culture (Krober, 1952; Mitchell & Willower, 1992). Accordingly, the third dimension in the theoretical framework centred on a more encompassing view of the school community and its culture.

The management dimension was conceptualised in terms of the school organisation – an organisational perspective in which teachers are seen as staff and their behaviours are managed to attain organisational goals. The role of the principal is supporting individuals, harnessing their professional aspirations, professional development, coaching, monitoring performance, resolving internal conflict, and planning for the school's future.

The pedagogic dimension was restricted to leadership activities directly associated with the learning of children and the school's instructional program – pedagogic leadership (MacNeill,

Cavanagh & Silcox, 2005). For example, ensuring the school environment fosters student learning; and applying knowledge of pedagogy in the planning, execution, and evaluation of learning and teaching.

The cultural dimension was about developing kinship both within the school and in the local community through encouraging dialogue between all parties leading to a common and unified understanding of the school's culture and of the learning community (Cavanagh & Dellar, 2003). A key aspect of this leadership role is a visionary view of education and its function in society – promoting the need for schooling to be renewed (Glickman, 1993; Silcox & Cavanagh, 2004; Sirotnik, 1999; Smith, 1999; Soder, 1999).

These three dimensions were then used to operationally define 11 hypothesised elements of principal leadership.

1. Attention to individuals – Attention to individual teachers, provision of professional development, coaching of teachers, and recognition of teacher and student effort.
2. Resolving conflict – Resolving tensions or conflict arising between cliques or informal groups within the staff.
3. Pressing for goal attainment – Encouraging teachers to work towards attaining the school's goals.
4. Scenario planning – Examining views of the school's future and making decisions about the school's future.
5. Providing a learning environment – Ensuring the school environment is effective in terms of improved student learning.
6. Applying pedagogy – Demonstrating and applying knowledge of theories concerning student learning.
7. Building a partnership with the local community – Identifying and assisting meeting of local community needs.
8. Building partnerships with parents/caregivers – Promoting and developing equitable relationships with parent/caregivers.
9. Communicating with parents/caregivers – Providing information for parents/caregivers and encouraging them to communicate with the school.
10. Developing common values within the staff – Building a cohesive and supportive value system amongst the staff.
11. Promoting renewal of schooling – Advocating need for morally-positioned changes to education.

Research Objectives

The aim of the study was to accurately describe aspects of the leadership role exercised by 55 principals from the Canning Education District in Western Australia as observed by teachers. This included measuring teacher observations and statistically modelling the associations between the observations. The research questions were:

1. Can a linear scale of teacher observations of school principal behaviours be constructed?
2. Are there differences in teacher observations of principal's behaviours?
3. Can a multi-element model of teacher observations of principal's behaviours be developed and empirically confirmed?
4. What are the relations between elements in a model of teacher observations of their principal's behaviours?

Research Methods

The sample was 389 teachers from 48 primary and seven high schools in the Canning Education District of Western Australia. Sample selection was by convenience since all the schools were participating in an Australian Research Council funded school improvement project.

The instrument of data collection was a previously developed instrument that elicited teacher observations of principal behaviours (Cavanagh, Dellar, MacNeill, & Romanoski, 2005). This instrument had been developed in 2004 using Rasch rating scale model analysis but the organisation of items into groups and the likely presence of a factorial structure within the data had not been tested. Also, recent local qualitative research conducted into pedagogic leadership since the instrument was developed suggested the content validity of instrument could be sharpened. Further, the original instrument development process used data from a sample of 208 teachers from 25 schools and it was possible that the instrument could also be improved by analysis of data from a larger sample.

For these reasons, the analysis of data proceeded through a sequence of stages commencing with a Rasch model analysis (Rasch, 1960/1980) to test for scale linearity followed by *LISREL* structural equation modelling (Jörkeskog & Sörbom, 1992, 2001) to test for structuring within the data and dependencies between variables.

Rasch model analysis

Items were classified in accord with the 11 element conceptualisation in the theoretical framework – see Appendix 1. Data from the 50 items were then analysed using the RUMM computer program - Rasch Unidimensional Measurement Model (Andrich, Sheridan, Lyne & Luo, 2000). The items were scored from 0 to 3 (0 for strongly disagree to 3 for strongly agree). The decision to use a stochastic measurement model such as the Rasch rating scale model rather than a deterministic model, was primarily due to the first research question concerning developing a linear (interval) scale (Bond & Fox, 2001). Implicit in this objective was the necessity for compliance with stringent measurement requirements. That is: the need for dimensionality - the data measures a single or dominant trait; qualification - data can be compared; quantification - variables are measured in common units; and linearity - data is positioned on a line or scale (Wright & Masters, 1982; Wright, 1999). The secondary reason for using the stochastic measurement model was the need for interval rather than ordinal data for the subsequent stages of the research in which parametric techniques were applied (Fraenkel & Wallen, 2004).

The overall fit of data to the Rasch model was tested by calculating RUMM summary test of fit statistics. In an ideal data to model fit, the fit residuals for items and persons should have a mean of 0.00 and a standard deviation of 1.00 (RUMMLab, 2004). A chi square is estimated to

show whether or not the items are eliciting data on a uni-dimensional trait of the respondents – a high probability value (p. >0.05) evidences uni-dimensionality (RUMMLab, 2004). The separation between person ability and item difficulty parameters assumed in the Rasch model is shown by the separation index and ideally this should be high - close to 1.0 (RUMMLab, 2004).

Since the data were polytomous (multiple response categories), it was deemed desirable for the respondents to have answered the items in a logical and consistent manner. This was tested by estimating the thresholds between adjacent response categories – the person ability logit at which the respondents had an equal probability of selecting either response category. A sequential order of thresholds for an item provides evidence of logical use of the rating scale categories. RUMM was also used to test the fit of data from individual items to the model by estimating residuals and Chi square. The residual for an item is the difference between the actual teacher responses and the expected responses as specified by the model - the residual should ideally be less than ± 2.0 (RUMMLab, 2004). The Chi-Square test estimates the probability that an item's data fit the model well and a high probability value, p.>0.05, shows the fit is good (RUMMLab, 2004).

With regard to the second research question, the Rasch rating scale model matches the ability of the respondents to affirm the items against the difficulty of the items. Both person ability and item difficulty are plotted on one interval scale as logits. For the data in this study, both measures of individual teacher affirmation of principal behaviours and also of the difficulty they had in affirming specific principal behaviours were estimated.

Structural equation modelling analyses

LISREL confirmatory factor analysis (CFA) (Jörkeskog & Sörbom, 1992, 2001) was used to test whether the data were consistent with the hypothesised 11-element theoretical model. For the CFA, a minimum of two indicator variables were specified for each of the 11 latent variables (26 indicator variables in total), the means and standard deviations of the indicator variables were calculated, and a correlation matrix comprising the indicator variables was generated. In *LISREL* SEM, data fit the hypothesised model well when: the goodness of fit index (GFI), comparative fit index (CFI) and the normed fit index (NFI) are close to 1.0; the root mean square residual (RMR) is close to zero; and the root mean square error of approximation (RMSEA) is less than 0.08 (Kelloway, 2002; Rigdon, 1996). When different models are tested, the parsimony normed fit index (PNFI) is estimated to compare the parsimony of the different models. Although higher values for this index indicate a more parsimonious fit, there is no standard for how high. Kelloway (1998) considered it unlikely that the PNFI would likely ever reach the 0.90 cut-off used for other fit indices and Byrne (1998) suggested even indices above 0.70 were unlikely.

LISREL latent variable path analysis (LVPA) (Jörkeskog & Sörbom, 1992, 2001) was then applied to identify and confirm dependency in data from the 11-element factorial model. Specification of a structural model comprising postulated dependency between variables that is to be tested by LVPA requires the variables to be identified as exogenous (independent) or endogenous (dependent). In LVPA, the criteria for goodness of fit of the data to the model are similar to those for CFA, but additionally, a Chi square is estimated and this should ideally be high with p. >0.05 although this can be difficult to achieve with large samples. Also, in LVPA, the path coefficients (β and γ - standardised regression coefficients), are calculated to show the strength of specified directional associations between variables and the *t-test* is applied to determine whether

such relations are statistically significant (p. <0.05). In this study, a preliminary structural model was tested by LVPA and the results of the SEM analysis were used to specify a second model for subsequent testing by LVPA.

Results

The following presentation and explanation of the empirical results is organised into two sections. The first section is the Rasch model analysis results; the second is the structural equation modelling analysis results.

Rasch model results

RUMM summary test-of-fit statistics (see Table 1) showed the polytomous data from the 50 items conformed to the requirements of the Rasch rating scale model – the scale was a linear measure. While the location of the calibrated teacher scores was higher than that of the location of the item difficulties due to many of the items being comparably easy for the respondents to affirm, the distribution of the person and item residuals (fit statistic standard deviations) shows a low level of 'noise' in the data. The Chi square probability value of 0.62 shows the items were likely eliciting data on a 'uni-dimensional' trait of the respondents. The separation index of 0.97 was very close to ideal.

TABLE 1: SUMMARY TEST-OF-FIT STATISTICS FOR 50-ITEM SCALE OF TEACHER OBSERVATIONS OF PRINCIPAL LEADERSHIP (N=389)

Item-Person Interaction				
	Items		Teachers	
	Location	Fit Statistic	Location	Fit Statistic
Mean	0.00	- 0.28	1.69	-0.50
SD	0.67	1.07	1.93	1.96
Item-Trait Interaction				
Total Item Chi Sq	242.50			
Total Degree Freedom	250.0			
Total Ch Sq Probability	0.62			
Power of Test-of-Fit				
Power is EXCELLENT				
Based on separation Index of 0.97				

The thresholds between adjacent response categories were ordered for all 50 items indicating the respondents were logical and consistent in their use of the response scale for all the items.

The fit of data from the 50 individual items to the model was very good (see Table 2). The item difficulty locations ranged from 1.54 to -1.61 logits showing the items presented varying levels of difficulty for the respondents to affirm. The absolute values for the majority of the residuals were less than 2.0 due to the actual scores being acceptably close to those predicted by the model. The Chi square results for the majority of the items included probability values >0.05 showing good fit of individual item data to the model.

TABLE 2: INDIVIDUAL ITEM FIT STATISTICS

Fit statistics	Location	SE	Residual	DegFree	DatPts	Chi Sq	Prob	degF
Element/items								
1. Attention to individuals								
1	-0.56	0.10	-0.02	364.6	377	3.49	0.62	5
2	-0.48	0.09	0.39	367.5	380	2.59	0.76	5
3	0.57	0.09	2.08	356.9	369	2.15	0.83	5
4	0.33	0.09	-0.29	358.8	371	5.26	0.39	5
5	0.54	0.09	-1.03	354.0	366	2.34	0.80	5
6	0.79	0.09	-1.98	347.2	359	9.80	0.08	5
7	-0.45	0.10	1.17	359.8	372	5.40	0.37	5
8	-0.07	0.09	0.39	359.8	372	3.61	0.61	5
9	0.83	0.08	-1.43	358.8	371	8.00	0.16	5
10	1.54	0.09	-0.71	353.0	365	5.29	0.38	5
11	1.53	0.09	-0.36	351.1	363	2.38	0.79	5
12	-0.77	0.10	1.41	361.7	374	5.02	0.41	5
13	-0.48	0.10	-1.32	360.7	373	6.95	0.22	5
14	-0.14	0.09	0.12	361.7	374	3.15	0.68	5
2. Resolving conflict								
15	0.97	0.09	1.13	337.5	349	20.09	0.00	5
16	1.09	0.10	0.20	336.6	348	14.71	0.01	5
3. Pressing for goal attainment								
17	-0.72	0.10	-1.19	365.6	378	5.20	0.39	5
18	-0.35	0.09	-0.64	358.8	371	5.35	0.37	5
4. Scenario planning								
19	0.49	0.09	0.88	354.9	367	5.50	0.36	5
20	0.42	0.09	-0.22	355.9	368	2.36	0.80	5
21	0.24	0.09	0.31	356.9	369	1.77	0.88	5
22	0.20	0.09	-1.16	356.9	369	5.97	0.31	5
23	-0.40	0.09	1.20	361.7	374	3.77	0.58	5
24	0.37	0.09	-0.44	359.8	372	2.98	0.70	5
5. Providing a learning environment								
25	-0.33	0.10	-0.46	360.7	373	1.85	0.87	5
26	-0.16	0.09	-0.01	358.8	371	4.02	0.55	5
6. Applying pedagogy								
27	-0.31	0.09	-1.29	360.7	373	0.71	0.98	5
28	0.16	0.09	-0.80	355.9	368	2.01	0.85	5
29	-0.48	0.10	0.07	357.8	370	4.84	0.44	5
30	-0.11	0.09	0.25	357.8	370	2.40	0.79	5
31	0.25	0.09	-1.24	354.0	366	1.76	0.88	5

7. Building a partnership with the local community								
32	0.42	0.12	0.31	226.3	234	1.52	0.91	5
33	0.73	0.12	2.13	222.4	230	7.42	0.19	5
34	0.38	0.12	-1.69	221.5	229	7.63	0.18	5
8. Building partnerships with parents/caregivers								
35	-0.81	0.13	-0.74	226.3	234	3.43	0.63	5
36	-0.50	0.13	0.29	223.4	231	4.76	0.45	5
37	-0.63	0.13	-0.01	229.2	237	2.74	0.74	5
38	-0.95	0.13	-0.79	229.2	237	1.80	0.88	5
39	0.33	0.12	-1.31	224.4	232	6.81	0.24	5
40	0.31	0.12	-1.26	222.4	230	5.08	0.41	5
9. Communicating with parents/caregivers								
41	-1.44	0.14	-1.22	231.1	239	7.31	0.20	5
42	-1.30	0.14	-0.88	228.2	236	8.23	0.14	5
43	-1.61	0.15	-1.03	231.1	239	6.97	0.22	5
10. Developing common values within the staff								
44	0.13	0.12	0.68	224.4	232	5.15	0.40	5
45	0.03	0.12	-1.85	226.3	234	2.93	0.71	5
46	0.13	0.12	-1.15	216.6	224	1.83	0.87	5
47	0.16	0.11	-1.39	227.3	235	3.77	0.58	5
48	0.21	0.12	-1.93	225.3	233	2.72	0.74	5
11. Promoting renewal of schooling								
49	0.04	0.10	1.98	335.6	347	7.24	0.20	5
50	-0.10	0.10	1.03	342.4	354	4.47	0.48	5

The locations of the individual items presented in Table 2 show which items were difficult for teachers to affirm and consequently specific principal behaviours and aspects of principal leadership that were less frequently observed by the teachers. For example, the item difficulty logits for the two *pressing for goal attainment* items were negative in comparison to the mainly positive logits for the six *scenario planning* items. The teachers were less affirmative of *scenario planning* behaviours than *pressing for goal attainment* behaviours and it could be concluded that scenario planning, as operationally defined and measured, was a less common attribute of the principals. Since the item difficulty logits have been plotted on an interval scale, such comparisons between the data are mathematically accurate and the scores from the items comprising an element can be aggregated and a mean logit calculated for the element (see Table 3).

The mean logits presented in Table 3 reveal that the most difficult leadership behaviours for the teachers to affirm concerned *resolving conflict* whereas *communication with parents/caregivers* was approximately two and a half times easier to affirm.

TABLE 3: AGGREGATED INDIVIDUAL ITEM LOGITS

Element	Items	Mean logit
Resolving conflict	15 &16	1.03
Building a partnership with the local community	32 to 34	0.51
Attention to individuals	1 to 14	0.23
Scenario planning	19 to 24	0.22
Developing common values within the staff	44 to 48	0.09
Promoting renewal of schooling	49 & 50	-0.03
Applying pedagogy	27 to 31	-0.15
Providing a learning environment	25 & 26	-0.25
Building partnerships with parents/caregivers	35 to 40	-0.43
Pressing for goal attainment	17 & 18	-0.54
Communicating with parents/caregivers	41 to 43	-1.45

Structural equation modelling results

The theoretical model of school principal behaviours comprised 11 elements and while these were originally assumed to constitute a dominant trait ('uni-dimensionality'), they were also assumed sufficiently discreet for the instrument to elicit data with a factorial structure ('multi-dimensionality'). This apparent contradiction is explainable by adopting a non-dichotomous view of dimensionality in which degrees of dimensionality are to be expected and this may well be evidenced by differences in the results of applying different measurement models (Cavanagh & Romanoski, 2005). The *LISREL* confirmatory factor analysis verified the data from the 50 items comprised 11 factors consistent with the theoretical model. The *LISREL* goodness of fit statistics presented in Table 4 show the data fitted the hypothesised 11-element measurement model very well.

TABLE 4: LISREL CFA GOODNESS OF FIT STATISTICS

GFI	CFI	NFI	RMR	RMSEA
0.87	1.00	1.00	0.034	0.014

Having confirmed the measurement model, a structural model was specified in which variables were classified as exogenous (independent) or endogenous (dependent). This initial model (Model 1) comprised one exogenous variable (*promoting renewal of schooling*) and a complex set of hypothesised dependencies between the ten endogenous variables. Although the data fitted this model well (see Table 5), examination of the strength and significance of the some of the paths between the endogenous variables suggested a more parsimonious model was possible. In particular, the endogenous variable of *attention to individuals* was not significantly dependent on the other nine endogenous variables so a second structural model (Model 2) in which this variable was specified as exogenous was tested.

TABLE 5: LISREL LVPA GOODNESS OF FIT STATISTICS

	χ^2	df	P. value	GFI	CFI	NFI	RMR	RMSEA	PNFI
Model 1	321.10	275	p <0.05	0.80	0.99	0.97	0.05	0.04	0.82
Model 2	398.11	283	p. <0.05	0.81	0.98	0.96	0.23	0.06	0.84

Interestingly, while the second model was marginally more parsimonious (PNFI increased from 0.82 to 0.84), the GFI, CFI and NFI were very similar and the residuals (RMR) and the errors (RMSEA) increased. Thus a problem in deciding which model best explained the data, or from a more scientific perspective, which model was more consistent with extant theory. Consequently, the previously reviewed literature on school and educational leadership was reconsidered and given the importance of school leadership concerning the organisational and professional needs of individuals, the second model was preferred.

Table 6 shows the dependency of endogenous variables on the two exogenous variables as postulated in Model 2.

TABLE 6: DEPENDENCY OF ENDOGENOUS VARIABLES ON EXOGENOUS VARIABLES

Exogenous / *Endogenous*	1 Attention to individuals	11.Promoting renewal of schooling
2 Resolving conflict	$\gamma = 0.73$ ($p < 0.001$)	N/S
3 Pressing for goal attainment	$\gamma = 0.83$ ($p < 0.001$)	$\gamma = 0.13$ ($p > 0.05$)
4 Scenario planning	N/S	N/S
5 Providing a learning environment	N/S	$\gamma = 0.83$ ($p < 0.001$)
6 Applying pedagogy	$\gamma = 0.39$ ($p < 0.01$)	$\gamma = 0.50$ ($p < 0.05$)
7 Building a partnership with the local community	N/S	$\gamma = 0.82$ ($p < 0.001$)
8 Building partnerships with parents/caregivers	N/S	N/S
9 Communicating with parents	$\gamma = 0.35$ ($p < 0.001$)	N/S
10 Developing common values within the staff	$\gamma = 2.64$ ($p < 0.01$)	N/S

Note: N/S indicates the dependency was not specified in the structural model tested

The exogenous variable attention to individuals had strong positive effects on five endogenous variables - resolving conflict, pressing for goal attainment, applying pedagogy, communicating with parents, and developing common values within the staff. For example, for each standard deviation increase in attention to individuals, resolving conflict increased by 0.73 standard deviations ($\gamma = 0.73$, $p < 0.001$). Similarly, promoting renewal of schooling had strong positive effects on providing a learning environment, applying pedagogy, and building a partnership with the local community.

Table 7 shows the direction and strength of hypothesised dependencies between the endogenous variables.

TABLE 7: DEPENDENCIES BETWEEN ENDOGENOUS VARIABLES

'Independent' / *'Dependent'*	2 Resolving conflict	4 Scenario planning	5 Providing a learning environment	7 Building a partnership with the local community	8 Building a partnership with parents	10 Developing common values within the staff
4 Scenario planning	N/S	1.00	N/S	$\beta = 0.04$ ($p > 0.05$)	N/S	$\beta = 1.08$ ($p < 0.001$)
6 Applying pedagogy	N/S	N/S	$\beta = 0.07$ ($p > 0.05$)	N/S	N/S	N/S
9 Communicating with parents	N/S	N/S	N/S	N/S	$\beta = 0.64$ ($p < 0.001$)	N/S
10 Developing common values within the staff	$\beta = 0.38$ ($p > 0.05$)	$\beta = -2.32$ ($p < 0.05$)	N/S	N/S	N/S	1.00

Notes: N/S indicates the dependency was not specified in the tested model.
Endogenous variable 3 (Pressing for goal attainment) was not specified as dependent on the other endogenous variables nor were the other endogenous variables specified as dependent on this variable.

Only three of the six hypothesised relations were statistically significant ($p < 0.05$). *Developing common values within the staff* had a strong effect on *scenario planning*. For each standard deviation increase in *developing common values within the staff*, *scenario planning* increased by 1.08 standard deviations ($\beta = 1.08$, $p < 0.001$). Also, *building a partnership with parents* had a strong effect on *communicating with parents* ($\beta = 0.64$, $p < 0.001$). In contrast, *scenario planning* had a strong negative effect on *developing common values within the staff*. For each standard deviation increase in *scenario planning*, *developing common values within the staff* decreased by 2.32 standard deviations ($\beta = -2.32$, $p < 0.05$).

Discussion

The following discussion of the empirical findings is organised into three sections. First, the

validity and reliability of the 50-item scale are assessed. Next, the Rasch analysis results are used to profile the teacher observations of the behaviours of 55 principals. Then, the confirmed relations between the variables in the preferred model are examined.

Psychometric properties of the data

The Rasch and SEM analyses applied different measurement approaches in estimating fit of data to the respective models.

The separation of the person ability parameter from the item difficulty parameter in the stochastic approach underlying the Rasch rating scale model has utility for scale construction and validation. In particular, when the data fit the Rasch model, the performance of individual items and of the response categories in the rating scale can be ascertained. However, caution should be exercised with data from items with high residuals and /or low Chi square probability values (see Table 2). For example, items 3 and 33; items 15 and 16. In the case of items 15 and 16 (*conflict resolution*), it is possible these items were eliciting data on a trait that was somewhat different from that measured by the other 48 items. However, the global fit statistics presented in Table 1 show the scale overall complied with the criteria for measurement (Wright & Masters, 1982; Wright, 1999), particularly linearity.

The four point Likert scale of response categories provided teachers with varying degrees of perception of principal leadership behaviours with appropriate choices in responding to the items – the response categories thresholds for all items were ordered according to respondent ability.

When the ability of each respondent to affirm that the 50 items described the principal (person ability) was estimated as a logit (the logarithmic odds of answering affirmatively), these logits had a standard deviation of 1.93 (see Table 1). This shows that the teachers had observed varying levels in the 55 principals' leadership behaviours. Also, there were consistent differences between responses to the items and when the difficulty of affirming individual items was estimated as logits, these item difficulty logits had a standard deviation of 0.67 (see Table 1). This is due to some behaviours being more frequently observed than others and this provides strong evidence of common and less common aspects of leadership.

The *LISREL* confirmatory factor analysis (CFA) tested the fit of data to the 11-element conceptualisation of leadership as specified in the factorial model. The CFA confirmed the postulated grouping of items and that the instrument was measuring 11 different aspects of leadership.

In terms of instrument content validity and reliability, the Rasch and CFA analyses justify confidence in the capacity of the items to elicit data which are commensurate with the 11-element theoretical model and that are measures of these 11 elements. Further, these 11 elements are statistically different components of an overall trait of leadership as observed by the teachers.

A hierarchy of principal leadership behaviours

Since the difficulty respondents demonstrated in affirming the respective items and groups of items was estimated on an interval scale of logits (see Tables 2 & 3), it is possible to accurately compare this difficulty between and within the 11 groups of items. Such comparisons can be used

to identify a hierarchical structure of leadership behaviours (observed) with low logits indicating common behaviours and high logits indicating uncommon behaviours (see Table 3). To avoid continual reiteration that the results were obtained from teacher observations, the following discussion assumes these observations were valid indicators of leadership behaviours and accordingly, the item logits and element mean logits are interpreted as demonstrated leadership behaviours.

Resolving conflict or tensions arising between cliques or informal groups within the staff was an uncommonly demonstrated attribute of the principals. This could be due to deliberate reluctance to become involved in the inter-personal relationships between staff and groups of staff, perhaps a general laissez faire approach towards managing the social dynamic within the staff, or possibly, inability or lack of skills for resolving interpersonal tension or conflict.

Building a partnership with the local community by identifying and assisting meeting of local community needs including soliciting the assistance of teachers to achieve this objective was also less commonly demonstrated. The principals may have been undisposed towards such activity or alternatively, the disposition was not overtly manifest.

Attention to individuals encompassed a range of behaviours - attention to individual teachers, provision of professional development, coaching of teachers, and recognition of teacher and student effort. While it might seem logical to differentiate between these behaviours, the CFA of the measurement model showed individual teachers were consistent in their responses to the respective items - the subscale was internally reliable. However, when the Rasch model was used to conjointly estimate person ability and item difficulty parameters, a more complex view was revealed. In particular, identification of teacher aspirations (Items 4 to 6) and coaching teachers (Items 9 to 11) were much less frequently evidenced than supporting teachers, provision of teacher professional development, and recognition of effort. One way to explain the difference is in terms of how the principals elicited the professional engagement of teachers. For example, coaching and identifying aspirations were explicitly individualised activities in which the principal interacts with a teacher one-on-one. In contrast, the other three activities are more directed at groups rather than individuals. Consequently, it is possible the principals worked with groups more than with individual teachers. While this inference is plausible, explanations are less obvious. Perhaps dealing with groups is more efficient use of limited time or it could be that the principals were less disposed to or less skilled in working with teachers individually. The latter explanation is supported by the previously noted low demonstration of resolving conflict within the staff.

The *scenario planning* behaviours were about the principal and staff contemplating alternative expectations of the school's future. However, while the result of such a process might well be a vision of the school's future, the scenario planning behaviours concerned a process and not an outcome. Of the six behaviours, one was commonly demonstrated, *informs teachers of his/ her vision of the school's future* (logit-0.40), while the other five behaviours were less common. Significantly, these five centred on encouraging teachers to question the school's current circumstances and to express preferences for the school's future state. Hence, the principals were seen to give more emphasis to expressing their own view than to soliciting teacher views.

The item difficulty logits for *promoting renewal of schooling* and *developing common values within the staff* were close to the scale mean logit (0.00) – other elements were respectively more and less commonly displayed. For example, *promoting renewal of schooling* by questioning

prevailing societal values towards education and the needs of children, and displaying a personal commitment to the role of education in transforming society, was near the scale midpoint (mean logit -0.03). Similarly, *developing common values within the staff* was demonstrably at an intermediate level on the behavioural scale (mean logit 0.09) with the constituent logits consistently close to 0.00 (see Table 2).

As was the case with *attention to individuals*, there was a significant variation in the behaviours constituting the principal *applying pedagogy* so consideration of only the mean logit for this element may be misleading. This is because *demonstrating knowledge of theories concerning student learning*, *expecting teachers to ensure sequential development of student knowledge, skills and attitudes*, and *convening meetings to discuss how student progress will be assessed and be reported* were more commonly exhibited than *justifying the school's instructional program in terms of theories about how children learn* and *convening meetings to ensure the school's instructional program is sequential and balanced* (see Table 2). This finding suggests differentiation between principal theoretical knowledge of pedagogy, the expectation of the knowledge being applied by others, and self application of this knowledge through personal responsibility and influence on the school's instructional program.

Providing a learning environment by ensuring the school environment is effective in terms of improved student learning was a more frequently demonstrated attribute of the principals (mean logit -0.25).

Some aspects of *building partnerships with parents/caregivers* such as encouraging teachers and parents/caregivers to be partners were also a frequently demonstrated attribute of the principals (see logits for Items 35 to 38 in Table 2,) but initiating programs to ensure the partnerships are equitable and empowering of parents/caregivers was comparatively uncommon (logits 0.33 and 0.31 for Items 39 & 40). The difference may be a result of principals having the willingness and skills to foster relationships with parents/caregivers by influencing teachers and parents, but not formalising the partnership-building process as a school program.

Principals' *pressing for goal attainment* by teachers was a commonly demonstrated behaviour (mean logit -0.54). The principals were often seen to provide teachers with explanations of why they should work towards achieving the school's goals and to commend teachers who enabled the goals to be achieved.

The most frequently observed principal behaviours were those associated with *communicating with parents/caregivers* (mean logit -1.45). These behaviours included provision of information to parents/caregivers on school programs and student progress, and encouraging parents/caregivers to communicate with the school and individual teachers.

In summation, the Rasch model analysis results provided a profile of leadership behaviours across the 55 principals - the 11 behavioural elements were presented hierarchically in line with item difficulty estimates. However, the analysis could not reveal associations between these elements. The next section uses the results of the *LISREL* analysis to identify dependencies between the elements.

An empirically validated model of principal leadership behaviours

The second structural model of the elements of leadership behaviours tested by *LISREL* latent

variable path analysis and explained in this section comprised two exogenous (independent) and nine endogenous (dependent) variables. A simply way to understand the structural model is to view the two exogenous variables as inputs into a postulated system of nine interrelated behaviours. The starting point for this understanding is examination of the respective effects of the input variables on the dependent variables.

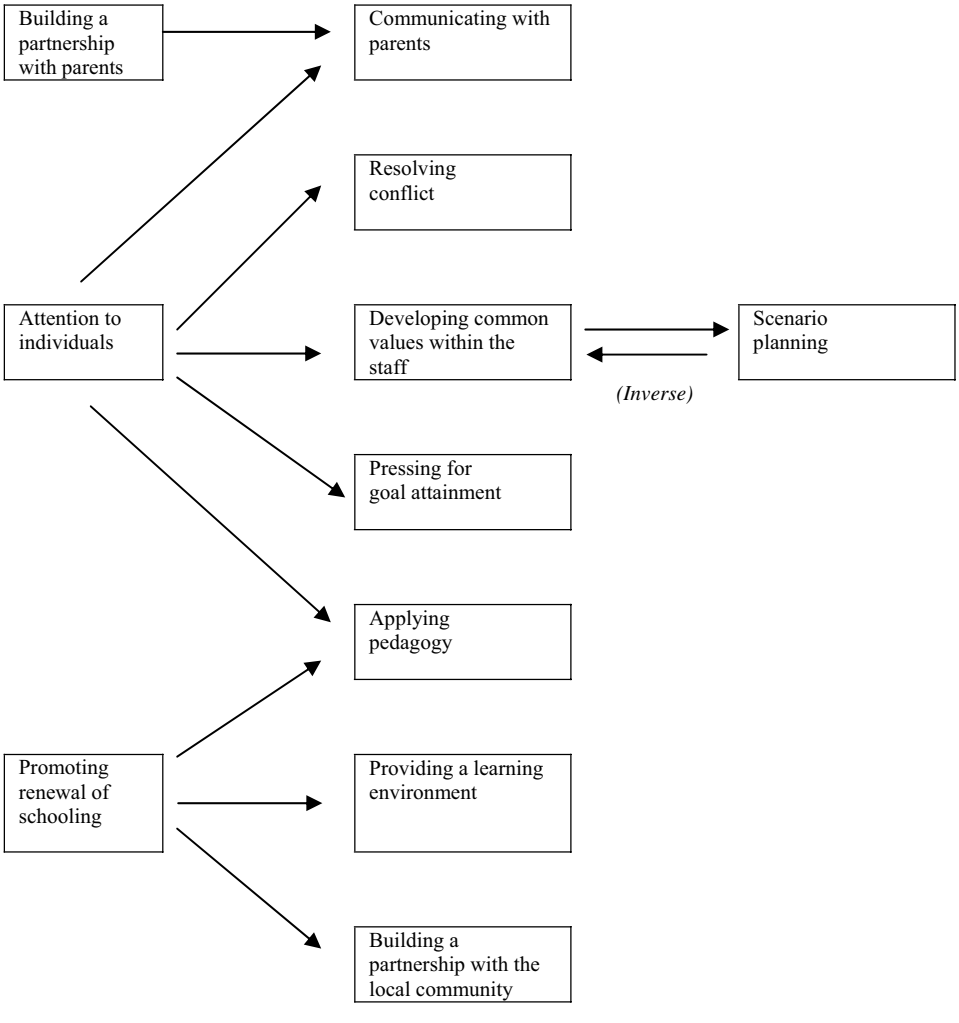
Attention to individuals had strong positive effects (see Table 6) on *resolving conflict* ($\gamma = 0.73$, $p < 0.001$), *pressing for goal attainment* ($\gamma = 0.83$, $p < 0.001$), *applying pedagogy* ($\gamma = 0.39$, $p < 0.01$), *communicating with parents* ($\gamma = 0.35$, $p < 0.001$), and *developing common values within the staff* ($\gamma = 2.64$, $p < 0.01$). Also, *promoting renewal of schooling* had strong positive effects on *providing a learning environment (*$\gamma = 0.83$, $p < 0.001$), *applying pedagogy* ($\gamma = 0.50$, $p < 0.05$), and *building a partnership with the local community* ($\gamma = 0.82$, $p < 0.001$). These findings show the importance of the principal supporting individual teachers, providing professional development, coaching teachers, recognising the efforts of teachers and students, and advocating the need for morally-positioned changes to education. Because these two behavioural elements positively affected seven other elements of leadership, they could be viewed as the *driving leadership forces* within the 11-element model. Indeed, these two variables were statistically independent of the other variables so demonstrating the behaviours incumbent in the other seven elements was unlikely to influence these two elements.

Next, a structural model can include specification of relations between the endogenous variables. When six such relations were specified for the structural model, only three relations were found to be statistically significant (see Table 7). *Scenario planning* was dependent on *developing common values within the staff* ($\beta = 1.08$, $p < 0.001$) suggesting that the implementation of s*cenario planning* was reliant on *developing common values within the staff*. Additionally, the path from s*cenario planning* to *developing common values within the staff* was strong but inverse ($\beta = -2.32$, $p < 0.05$), suggesting s*cenario planning* had a deleterious effect on *developing common values within the staff*. Perhaps asking questions of the staff about the school's future can result in diminution of staff consensus about what is valued within the school and concomitantly, frustrate development of a unified value system. Also, *communicating with parents* was dependent on *building a partnership with parents* ($\beta = 0.64$, $p < 0.001$). This relation could be interpreted as *building a partnership with parents/caregivers* being the precursor to *communication with parents/caregivers* – building a partnership leads to communication but communication does not necessarily produce the partnership.

The foregoing relations between the variables in the structural model are presented in Figure 1 below. The arrows in the model represent the statistically significant ($p < 0.05$) paths confirmed by the *LISREL* LVPA analysis. For example, *communicating with parents* is shown dependent on *building a partnership with parents* and *attention to individuals*. It should be noted that presentation of the variables and respective paths in the model required a reordering the variables in a sequence different from that used in the previous discussion of the *LISREL* results. Also, *building a partnership with parents* is portrayed as an input variable because it affected one variable (*communicating with parents*) yet was independent of this and all the other variables. Consequently the model is a simplification of the highly complex path analysis diagram generated by *LISREL* which included 26 indicator variables and both statistically and non-statistically significant relations.

The model clearly shows particular effects that were less obvious in the tabulated results. For example, *applying pedagogy* was dependent on two independent variables - *attention to individuals* and *promoting renewal of schooling*. The implication of this dependency is that applying pedagogy is likely contingent on these two independent variables. A second obvious feature in the model is the mediating effect of *developing common values within the staff* – this variable mediates the effect of attention to individuals on scenario planning. The model also draws attention to the absence of paths between particular variables. While the absence of paths cannot be assumed as evidence of no relation between these variables, this does provide a contrast with the relations that were tested and confirmed.

FIGURE 1: MODEL OF SCHOOL PRINCIPAL LEADERSHIP



Conclusion

The confirmed structural equation model shows dependencies between variables that can be interpreted as higher and lower-order principal behaviours. Many of the variables were statistically dependent on *attention to individuals* and *promoting renewal of schooling* so these two variables could be viewed as higher-order principal leadership constructs. Alternatively, the Rasch model analysis logits for the variables show the difficulty the teachers demonstrated in affirming the 11 variables were observable in their principal. Conjoint consideration of both sets of results adds to extant knowledge on principal leadership and suggests aspects of this leadership requiring attention in leadership preparation and professional development programs.

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APPENDIX 1: LINEAR SCALE OF TEACHER OBSERVATIONS OF PRINCIPAL LEADERSHIP

If you **strongly agree** the words describe the principal	√	3	2	1
If you **agree** the words describe the principal	4	√	2	1
If you **disagree** the words describe the principal	4	3	√	1
If you **strongly disagree** the words describe the principal	4	3	2	√

	1. Attention to individuals	Strongly Agree	Agree	Disagree	Strongly Disagree
1	Is aware of teachers requiring support in meeting their professional obligations	4	3	2	1
2	Is available and accessible to teachers requiring support	4	3	2	1
3	Provides support for teachers even when not support is not requested	4	3	2	1
4	Talks with individual members of staff and groups about their aspirations	4	3	2	1
5	Identifies the aspirations of individual members of staff	4	3	2	1
6	Knows when individual members of staff have realised their aspirations	4	3	2	1
7	Is involved in planning professional development for teachers	4	3	2	1
8	Provides adequate resources for individual and collective professional development	4	3	2	1
9	Finds time to talk with individual teachers about their teaching	4	3	2	1
10	Provides timely and relevant advice to individual teachers on improving their teaching	4	3	2	1
11	Is a major influence in enabling individual teachers to be more instructionally competent	4	3	2	1
12	Praises individual students	4	3	2	1
13	Monitors student achievement throughout the school	4	3	2	1
14	Acknowledges the work of individual teachers	4	3	2	1
	2. Resolving conflict	Strongly Agree	Agree	Disagree	Strongly Disagree
15	Resolves tensions or conflict arising between individuals within cliques or informal groups	4	3	2	1
16	Resolves tensions or conflict arising between cliques or informal groups within the staff	4	3	2	1

	3. Pressing for goal attainment	Strongly Agree	Agree	Disagree	Strongly Disagree
17	Explains why teachers should work towards attaining the school's goals	4	3	2	1
18	Commends teachers who enable attainment of the school's goals	4	3	2	1
	4. Scenario planning	Strongly Agree	Agree	Disagree	Strongly Disagree
19	Encourages particular members of staff to question specific aspects of school operations	4	3	2	1
20	Stimulates staff-wide questioning of all aspects of the school's operations	4	3	2	1
21	Generates debate about the future of the school	4	3	2	1
22	Presents teachers with scenarios of the school's future	4	3	2	1
23	Informs teachers of his/ her vision of the school's future	4	3	2	1
24	Encourages teachers to express their own expectations of the school's future	4	3	2	1
	5. Providing a learning environment	Strongly Agree	Agree	Disagree	Strongly Disagree
25	Ensures classroom and school facilities are conducive to improving student learning	4	3	2	1
26	Evaluates the effectiveness of classroom environments in terms of improved student learning	4	3	2	1
	6. Applying pedagogy	Strongly Agree	Agree	Disagree	Strongly Disagree
27	Demonstrates knowledge of theories concerning student learning	4	3	2	1
28	Justifies the school's instructional program in terms of theories about how children learn	4	3	2	1
29	Expects teachers to ensure sequential development of student knowledge, skills and attitudes	4	3	2	1
30	Convenes meetings to discuss how student progress will be assessed and be reported	4	3	2	1
31	Convenes meetings to ensure the school's instructional program is sequential and balanced	4	3	2	1
	7. Building a partnership with the local community	Strongly Agree	Agree	Disagree	Strongly Disagree
32	Provides teachers with an explanation of local community needs	4	3	2	1
33	Organises sharing of school facilities with the local community	4	3	2	1
34	Incorporates community needs in school planning and facilities development	4	3	2	1

	8. Building partnerships with parents/caregivers	Strongly Agree	Agree	Disagree	Strongly Disagree
35	Clearly and convincingly articulates the school mission to meetings of parents/ caregivers	4	3	2	1
36	Explains the importance of the home environment for student learning to parents/ caregivers	4	3	2	1
37	Encourages teachers to elicit the involvement of parents/caregivers in their child's learning	4	3	2	1
38	Explains to teachers the benefits of developing partnerships with parents/ caregivers	4	3	2	1
39	Initiates programs to develop equitable partnerships with parents/ caregivers	4	3	2	1
40	Initiates programs that empower parents/ caregivers to contribute to their child's education	4	3	2	1
	9. Communicating with parents/caregivers	Strongly Agree	Agree	Disagree	Strongly Disagree
41	Provides information on school programs and activities to parents/ caregivers	4	3	2	1
42	Provides parents/ caregivers with information on their child's progress at school	4	3	2	1
43	Encourages parents/ care-givers to communicate with the school and individual teachers	4	3	2	1
	10. Developing common values within the staff	Strongly Agree	Agree	Disagree	Strongly Disagree
44	Develops an environment in which teachers value mutual support and professional cohesion	4	3	2	1
45	Views potential problems as opportunities to improve the school	4	3	2	1
46	Identifies what teachers collectively value and expect of the school	4	3	2	1
47	Explains to teachers what they collectively value and expect of the school	4	3	2	1
48	Models and reinforces the collective values of teachers	4	3	2	1
	11. Promoting renewal of schooling	Strongly Agree	Agree	Disagree	Strongly Disagree
49	Questions prevailing societal values towards education and the needs of children	4	3	2	1
50	Displays a personal commitment to the role of education in transforming society	4	3	2	1